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ONTARIO AGRICULTURAL COLLEGE
EXPERIMENT STATION

BULLETIN LXXIX.

EXPERIMENTS WITH WINTER WHEAT.

BY THOMAS SHAW, PROFESSOR OF AGRICULTURE, AND
C. A. ZAVITZ, B.S.A., EXPERIMENTALIST.

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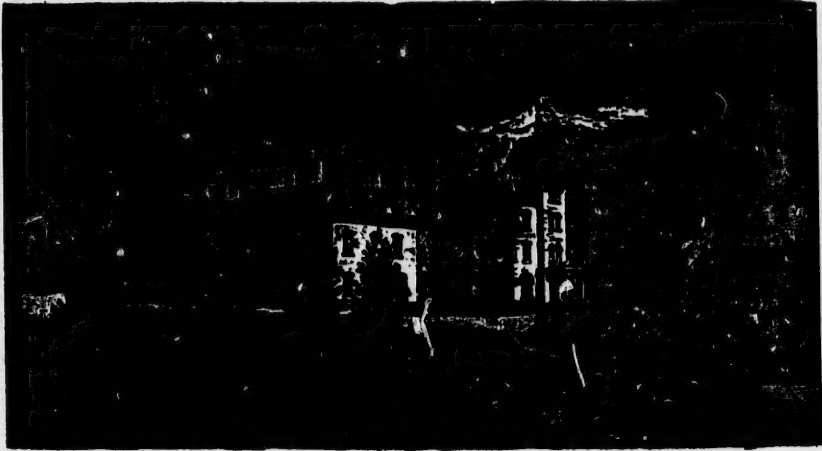
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BULLETIN LXXIX.

EXPERIMENTS WITH WINTER WHEATS.

In growing winter wheat, and indeed any other form of cereal crop, it is highly important that the farmers give much attention to the selection of the more useful varieties. In some seasons this is not so important, as almost any variety will give a fair return, but in others when the conditions of growth and ripening are not so favorable the difference in the yields in some instances amounts to nearly 50 per cent. with varieties grown under the same conditions. As it is impossible to forecast the nature of the season, it is always better to be forearmed by sowing varieties possessed of sufficient vigor and hardihood to enable them to bear up well under adverse conditions.

The qualities to be sought in winter wheat include the following:

1. Ability to give good yields. Occasionally we meet with varieties having nearly all the requisites given below, and yet the yield from them is only ordinary.
2. The quality of the grain, including weight per bushel and value for milling purposes. A variety possessing good milling properties is certainly to be much preferred to one equal in other respects but lacking in these.
3. Strength of straw. This is very important in some seasons, more especially on soils where the grain is liable to lodge, as it bears so directly on the yields and on the labor of harvesting.
4. Non-liability to rust. Although rust is largely dependent on season, soil and location, some varieties have the power of resisting it in a marked degree.
5. Earliness in maturing. This is also intimately associated with yield, as in some seasons an advantage of from three to five days in early ripening will make a great difference in the returns.
6. The presence or absence of beards. Beards are so far objectionable unless there is decided superiority in other directions, as they are less pleasant to handle, they lessen the value of the chaff for feeding purposes and are associated more or less with lack of refinement in quality.

Owing to the low prices ruling for winter wheat there will be an inclination to sow a less acreage this season. This tendency can easily be carried too far. We do well to remember that we have an excellent wheat producing country and that we want large quantities of straw for bedding which cannot be secured so effectually in any other

Guelph,

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way. There is always less hazard in growing a variety of crops, and it also furnishes a more equable division of the work of the farm. And there is at the same time a possibility of some advance in prices. It is at least questionable as to whether this province should at any time grow less wheat than will suffice for home consumption.

LOCATION AND SOIL. All the varieties of winter wheat, both native and foreign, were grown in plots side by side in the same range. These plots contain each exactly the one-hundredth part of an acre. The yield per acre is estimated from the actual yield of the plots. The aspect of the land is southwesterly, with so little slope, however, that it is almost imperceptible. The soil may be designated as a mild clay loam.

PREPARATION OF THE SOIL. The soil was prepared on the bare fallow system to secure uniformity of condition in a field devoted to the growth of experimental grains. This was the only bare fallow that we had on the farm. The cultivation given was much the same as is usually put upon bare fallows. Barnyard manure was applied at the rate of 15 tons per acre in the spring of 1890 and a crop of rape was grown and pastured off upon the land the same year. No manure has been put upon it since.

SELECTION OF VARIETIES. In selecting varieties to sow those kinds should be preferred which have given the most satisfaction during a term of years rather than for one year. We sometimes find varieties give excellent yields one year which do very poorly the next. We are now able to give facts relating to the behaviour of a considerable number of varieties for three years as shown in Table II., and these should certainly prove valuable to the farmers of this province engaged in growing winter wheat.

THE VARIETIES GROWN. There were in all 115 plots of winter wheat grown at this station during the present year, including 68 varieties. Of these 35 varieties were grown in duplicate plots; and in another field 8 varieties were grown in plots varying from half an acre to two acres. The larger plots were duplicates of some of the smaller plots, and the particulars relating to them will be given in the annual report. Of the 68 varieties grown, 44 were Canadian and American and 24 were foreign. The foreign varieties which were imported originally from Germany, England, France and Russia in 1889, are all from last year's seed. As none of these kinds have as yet proved equal to some of the best of the Canadian and American varieties and as many of them do not ripen sufficiently early to be reported upon in the bulletin with the latter, we do not feel justified as yet in recommending the farmers to grow them. This bulletin therefore gives the particulars relating to 44 Canadian and American varieties grown under exactly the same conditions.

Table I.

1. Surpri
2. Early
3. Rogers
4. Red V
5. Golden
6. Bonnel
7. Golden
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8. Manche
9. Stand
10. Hybrid
11. Martin
12. Seneca
13. Lancast
14. Red Lic
15. New M
16. Americ
17. Egypti
18. Garfield
Cros
Jones W
Bulgaria
Winter
Canadian
Democr
Dawson
Mediterr
Fulcaste
Red Wo
Deitz Lo
Reliable
Fultz ...
Russian
Coryell
Rutherfo
Rumsey
Genesee
Valley
Walker
Hybrid
Monette
Red Rus
Longber
Velvet C
Manilla
Scott ...

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Table 1. gives the characteristics of 44 varieties of winter wheats.

	Nature of head.	Color of		Date of maturity.	Comparative amt of rust. { 0 none. 100 much. }	Per cent. of straw lodged at harvest.
		Chaff.	Grain.			
1. Surprise	Bald	White	White	July 27	30	18
2. Early Red Clawson....	"	Red ..	Red ..	" 26	50	50
3. Rogers	"	White	" ..	" 27	25	70
4. Red Velvet Chaff	"	" ..	" ..	" 27	25	70
5. Golden Drop	"	Red ..	" ..	" 26	50	70
6. Bonnell or Landreth...	"	White	White	" 25	20	70
7. Golden Cross or Volunteer	Bearded.	Red ..	Red ..	" 26	60	20
8. Manchester	Bald	White	" ..	" 27	45	30
9. Standard	"	Red ..	White	" 25	45	40
10. Hybrid Mediterranean	Bearded.	" ..	Red ..	" 26	40	70
11. Martin Amber	Bald	White	White	" 27	45	85
12. Seneca or Clawson....	"	Red ..	White	" 25	30	50
13. Lancaster	Bearded.	" ..	Red ..	" 26	45	95
14. Red Lion	"	" ..	" ..	" 26	25	97
15. New Monarch	Bald	White	" ..	" 26	50	30
16. American Bronze	"	" ..	" ..	" 28	60	5
17. Egyptian	Bearded.	" ..	" ..	" 26	40	60
18. Garfield or Natural Cross	Bald	" ..	White	" 26	25	90
19. Jones Winter Fyfe	"	" ..	Red ..	" 26	45	50
20. Bulgarian	Bearded.	" ..	White	" 26	35	30
21. Winter Pearl	Bald	" ..	" ..	" 28	40	60
22. Canadian Velvet Chaff.	"	" ..	" ..	" 26	25	60
23. Democrat	Bearded.	" ..	" ..	" 26	25	40
24. Dawson's Golden Chaff.	Bald	Red ..	" ..	" 26	80	0
25. Mediterranean	Bearded.	White	Red ..	" 26	65	90
26. Fulcaster	"	" ..	" ..	" 24	45	30
27. Red Wonder	"	" ..	" ..	" 27	55	95
28. Deitz Longberry	"	" ..	" ..	" 26	55	80
29. Reliable	"	" ..	" ..	" 27	25	10
30. Fultz	Bald	" ..	" ..	" 24	40	10
31. Russian Amber	Bearded.	" ..	" ..	" 26	30	40
32. Coryell	Bald	Red ..	" ..	" 24	60	80
33. Rutherford	Bearded.	" ..	" ..	" 26	35	90
34. Rumsey	"	White	White	" 29	25	40
35. Genesee	"	" ..	" ..	" 26	40	50
36. Valley	"	" ..	Red ..	" 26	30	10
37. Walker's Reliable	"	" ..	" ..	" 27	30	50
38. Hybrid Delhi	Bald	" ..	White	" 27	20	78
39. Monette	"	" ..	Red ..	" 28	35	50
40. Red Russian	"	Red ..	" ..	" 27	30	20
41. Longberry Red	Bearded.	" ..	" ..	" 27	50	80
42. Velvet Chaff	"	" ..	" ..	" 24	40	10
43. Manilla	Bald	White	White	" 26	40	50
44. Scott	"	" ..	Red ..	" 27	30	10

The extent to which the plots were affected by rust and by weak aw may be noticed at a glance by referring to the two right hand

columns respectively of the table, but it should be remembered that these relate only to the present year.

MANNER AND TIME OF SEEDING. The seed was sown by hand as we have no machines suitable for sowing in drills in plots of the size mentioned. The plots were all sown Sept. 2nd, with the exception of Nos. 27, 29, 36 and 40 of Table I. given below, which were sown Sept. 9th, and Nos. 34, 37 and 39, which were sown Sept. 15th. The same amount of seed was sown upon each plot, at the rate of $1\frac{1}{2}$ bushels per acre by weight.

THE CONDITIONS OF SEASON AND WEATHER. These were on the whole not so favorable as during the previous wheat year. The weather in the autumn was such that all the Canadian and American varieties made a good growth and they also passed the winter safely. But the months of May and June were abnormally wet, which along with the heavy winds that prevailed caused more or less of lodging in nearly all the varieties. Some of them also rusted considerably. In fact none of them could be said to be entirely free from leaf rust. During the ripening period the temperature was unduly high, but notwithstanding the yields were in many instances fair.

Table II. gives yields of 15 varieties for three years.

Varieties.	Straw per acre (tons).		Weight per meas- ured bushel (lb.).		Grain per acre (bush. 60 lb.).	
	1892.	Average 1890-92.	1892	Average 1890-92.	1892.	Average 1890-92.
Surprise	3.43	2.71	59.8	60.6	45.7	46.37
Early Red Clawson	3.22	2.57	59.3	59.9	46.7	45.70
Rodgers	3.23	2.53	60.0	61.1	40.5	43.25
Red Velvet Chaff	3.07	2.49	57.5	60.8	35.8	42.83
Golden Drop	3.46	2.53	62.0	62.1	51.2	42.66
Bonnell or Landreth	3.27	2.76	58.4	60.7	34.3	41.96
Golden Cross or Volunteer	2.83	2.50	61.5	61.3	43.8	41.93
Manchester	3.41	2.47	60.4	62.0	45.4	41.17
Standard	3.44	2.73	57.8	60.2	31.8	40.66
Hybrid Mediterranean	3.53	2.72	61.0	61.8	45.5	40.53
Martin Amber	3.18	2.65	60.2	61.2	37.3	40.07
Seneca or Clawson	3.45	2.76	58.8	60.2	34.0	39.49
Lancaster	3.61	2.86	61.5	62.6	41.3	39.13
Red Lion	3.96	2.81	61.1	61.7	41.2	38.36
New Monarch	3.27	2.49	61.5	60.6	41.1	33.97

As the facts given in Table II. relate not only to results of the year's crop, but also to the average obtained for the past three years they may be regarded as of special importance. The average yield

ered that of grain per acre of these 15 varieties was 30.9 bush. in 1890; 51.6 bush. in 1891, and 41 bush. in 1892. For the three years the average was 41.19 bush. The average weight per bush. in 1890 was 60 lb.; in 1891, 63.3 lb.; in 1892, 60 lb. For the three years the average was 61.1 lb. The Surprise heads the list in point of yield, averaging 46.37 bush. per acre for the three years. It is possessed of many good qualities, as ability to yield well, good strength of straw, freedom from rust and good milling properties. The Early Red Clawson follows closely with an average yield of 45.70 bush. Its earliness of ripening is a strong point in its favor. The Rodgers which comes third on the list does not stand high as to milling properties. The Manchester which yields well in some localities, has not done so well with us, as it is somewhat prone to rust. The Red Lion, which several years ago was sold in some localities for \$15 per bush. is very weak in the straw. It weighs well, and this is the best feature about it.

Table III. gives yields of 8 varieties for two years.

Varieties.	Straw per acre (tons).		Weight per measured bushel (lb.).		Grain per acre (bush. 60 lb.).	
	1892.	Average 1891-2.	1892.	Average 1891-2.	1892.	Average 1891-2.
American Bronze	3.38	2.77	59.3	61.1	39.8	52.5
Egyptian	3.32	2.63	61.5	62.7	47.5	50.4
Garfield or Natural Cross	2.87	2.69	59.3	60.6	32.5	48.4
James' Winter Fyfe	2.54	2.15	59.2	61.7	37.8	47.1
Bulgarian	3.08	2.34	61.6	63.0	47.7	47.0
Winter Pearl	2.84	2.67	60.5	60.7	36.1	45.8
Canadian Velvet Chaff	2.98	2.40	55.4	58.8	30.7	45.3
Democrat	3.18	2.43	62.0	63.2	47.2	44.4

These varieties have been grown here for but two years, and like those of the previous table under the same conditions. The average yield obtained from them in 1891 was 55.3 bush. per acre; in 1892, 41.19 bush.; for the two years 47.6 bush. The average weight per bush. in 1891 was 63.2 lb.; in 1892, 59.9 lb.; for the two years 61.5 lb. The American Bronze which stands first in point of yield for two years did not give nearly so good a return comparatively this year as last. Although it stood up well, it was considerably affected with rust. The Egyptian, though an old variety, has done well and it will also be observed that it weighs well. The Garfield which comes third in point of yield betrayed considerable weakness of

straw, while the plots on either side of it stood up well. Jones Winter Fyfe although possessed of first-class milling properties is only medium as to yield and weight of grain. The Bulgarian which bears considerable resemblance to the Democrat yields fairly and weighs well. It seems to be a rugged wheat and is possessed of good milling properties. The Canadian Velvet Chaff has done rather poorly with us this year. The yield of grain was comparatively low and it was notably deficient in weight.

Table IV. gives yields of 21 varieties for one year.

Varieties.	Straw per acre. (tons).	Weight per measured bushel (lb.).	Grain per acre. (bu. 60 lb.)
Dawson's Golden Chaff	3.46	59.5	51.2
Mediterranean	3.42	61.8	50.9
Fulcaster	3.23	64.5	50.5
Red Wonder	4.18	62.8	48.8
Deitz Longberry	3.34	61.9	48.7
Reliable	3.14	62.2	47.9
Fultz	3.12	62.5	47.5
Russian Amber	3.20	61.5	46.7
Coryell	2.86	61.5	46.2
Rutherford	3.61	59.8	46.2
Rumsey	3.35	61.5	45.1
Genesee	3.43	61.0	43.8
Valley	2.59	61.5	43.7
Walker's Reliable	2.66	60.4	42.9
Hybrid Delhi	2.86	59.5	42.8
Monette	3.34	59.0	42.1
Red Russian	3.16	61.4	41.4
Longberry Red	3.34	61.0	41.2
Velvet Chaff	2.98	63.0	40.5
Manilla	3.59	58.7	38.6
Scott	2.70	61.0	32.5

The 21 varieties in Table IV. were grown here this year for the first time in these comparative tests and considerably more than half the number were imported from the United States. The average yield per acre is 44.74 bush., and the average weight per measured bush. 61.3 lb. The yield of straw per acre is abnormally low being 3.2 tons per acre, which is probably 50 per cent. more than ordinary seasons. Weighing the straw at a later date would doubtless cause some reduction. The Dawson's Golden Chaff originally introduced in 1881 by Robert Dawson of Paris, Ont., comes first in point of yield. The wheat stood up better than any other variety but it was affected considerably by rust which no doubt affected the quality of the grain.

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The old Mediterranean, imported from the United States, comes second in point of yield showing that it still retains its old-time vitality. The Fulcaster, also from the United States, gave the remarkable weight of 64.5 lb. to the bush. The Red Wonder came out well but is very weak in the straw. It would probably do well on sharp, sandy land. The Scott, so popular at one time, seemed to be lacking in vitality and stands at the foot of the list in point of yield.

Table v. gives comparative summary of results.

	Grain per acre. (bu. 60 lb.)		Number of vari- eties.	Average yield of straw per acre. (tona.)	Average weight per measured bushel (lb.)	Average yield of grain per acre (bush. 60 lb.)
	51.2					
	50.9					
	50.5					
	48.8	Bald	24	3.29	59.61	40.15
	48.7	Bearded	20	3.17	61.64	45.53
	47.9					
	47.5	White Chaff	30	3.17	60.55	42.30
	46.7	Red Chaff	14	3.35	60.63	43.51
	46.2					
	46.2	White Wheat.....	15	3.23	59.60	39.92
	45.1	Red Wheat.....	29	3.23	61.08	43.97
	43.8					
	43.7					
	42.9					
	42.8					
	42.1					
	41.4					
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It will be observed here that generally speaking the bearded red chaff red wheats gave more straw and more grain per acre and also gave grain weighing more per bush. than the bald white chaff white wheats. There is very little difference in the relative quantities of straw produced. In weight of grain the average difference in favor of the bearded varieties as compared with the bald is 2.03 lb. In 1891 the difference, 1.37 lb., is also in favor of the bearded sorts. The red wheats outweigh the white varieties by 1.48 lb. per bush. In 1891 the difference in the same direction was 1.96 lb. In 1892 the bearded varieties gave an average yield of 5 bush. per acre more than the bald, while in 1891 the bald varieties yielded 9.9 bush. per acre more on an average than the bearded. The present season, the red wheats yielded 4 bush. per acre more than the white, while last season the white wheats yielded over 5 bush. more than the red. In Bulletin LXVII. issued on winter wheats in 1891, it is stated "that when wheat is grown under favorable conditions the bald varieties yield considerably more than the bearded." To this we may add that from the results obtained this year it would seem to be true that in seasons when the conditions are not really favorable the bearded varieties will yield more than the bald.

DISTRIBUTION OF SEED.

As we have a limited quantity of seed for distribution we append the following in reference thereto:—We will supply any of the following varieties, viz : American Bronze, Jones' Winter Fyfe, Early Red Clawson and Bulgarian in lots of one and two bushels. As the quantity of each variety is limited we can only agree to furnish seed while the supply lasts and in the order in which we receive the applications. The prices charged will be moderate. For further information apply to the Professor of Agriculture, Guelph, Ont.

Some of the varieties will be distributed in smaller lots through the medium of the Ontario Agricultural and Experimental Union. This Union which meets annually at the Agricultural College is composed of the officers, ex-students and students of the College, and all farmers throughout the province are invited to co-operate in the work that is being carried on by the Association. This work consists of the testing of seeds and fertilisers under conditions as nearly similar as may be found practicable. The seeds are furnished by the Union free to farmers and full instructions regarding the mode of conducting the tests are also furnished at the same time. The only return asked of the farmer is a report of the results to be sent after harvest by a time fixed upon as mentioned in the instruction sheet. These reports are made upon blank forms furnished to each experimenter along with the instructions. At the present time there are no less than 5,088 plots under experiment in this province conducted by ex-students and other farmers, the results of which are published annually, and cannot fail to be of much service to the agriculturist.

In the subjoined table will be found the different sets of varieties of wheats which will be sent by mail in half-pound lots of each variety to farmers applying for them and in the order of the application so long as the supply lasts.

Three sets of Fall Wheat for Co-operative Tests.

(1.)	(2.)	(3.)
Dawson's Golden Chaff.	Dawson's Golden Chaff.	Dawson's Golden Chaff.
American Bronze.	American Bronze.	American Bronze.
Early Red Clawson.	Fulcaster.	Jones' Winter Fyfe.
Bulgarian.	Red Wonder.	Fultz.
Mediterranean.	Surprise.	Golden Drop.

Each farmer wishing one of these sets will please address the Secretary, C. A. Zavitz, Experiment Station, Guelph, *mentioning which set he desires*, when the grain with instructions for testing, and blank forms on which to report, will be forwarded free of cost to his address.

CONCLUSIONS.

The results of the experiments may be thus summarised :

1. That the average yields per acre of the 44 Canadian and American varieties grown in 1892 were : straw 3.2 tons, grain 42.6 bush. per acre and weight per bush. 60.5 lb.

2 That as the averages obtained from the 15 varieties grown at this station for three years were 30.9 bush. in 1890 ; 51.6 bush. in 1891, and 41.6 bush. in 1892, while the average weight per bush. in these respective years was 60, 63.3 and 60 lb., we are justified in concluding that the wheat producing capabilities of Ontario are still of a high order.

3. The four best yielding varieties in 1892, all of which gave more than 50 bush. per acre, are Dawson's Golden Chaff, Golden Drop, Mediterranean and Fulcaster, named in the order of the yields which they made.

4. The four varieties giving the heaviest weights per bush. in 1892 were the Fulcaster, 64.5 lb. ; Velvet Chaff (bearded), 63 lb. ; Red Wonder, 62.8 lb. and Fultz, 62.5 lb.

5. The four best yielding white wheats in 1892, were Dawson's Golden Chaff, Bulgarian, Democrat and Surprise, and the four best yielding varieties of red wheat were the Golden Drop, Mediterranean, Fulcaster and Red Wonder, in the order named in both instances.

6. That the bald Velvet Chaff varieties gave an average of 7.8 bush. less per acre than the mean average of the 44 varieties grown in 1892 and weighed 3.1 lb. less per bush.

7. That in our experience of the past three years the average yields per acre of the white and red wheats have not been far different, being about one bushel per acre in favor of the white wheats.

8. That in our experience of the past three years we have found that the red wheats average from 1 to 2 lb. more per bush. than the white wheats.

(3).

Golden Chaff.
Bronze.
Winter Fyfe.

Drop.

Please address the
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